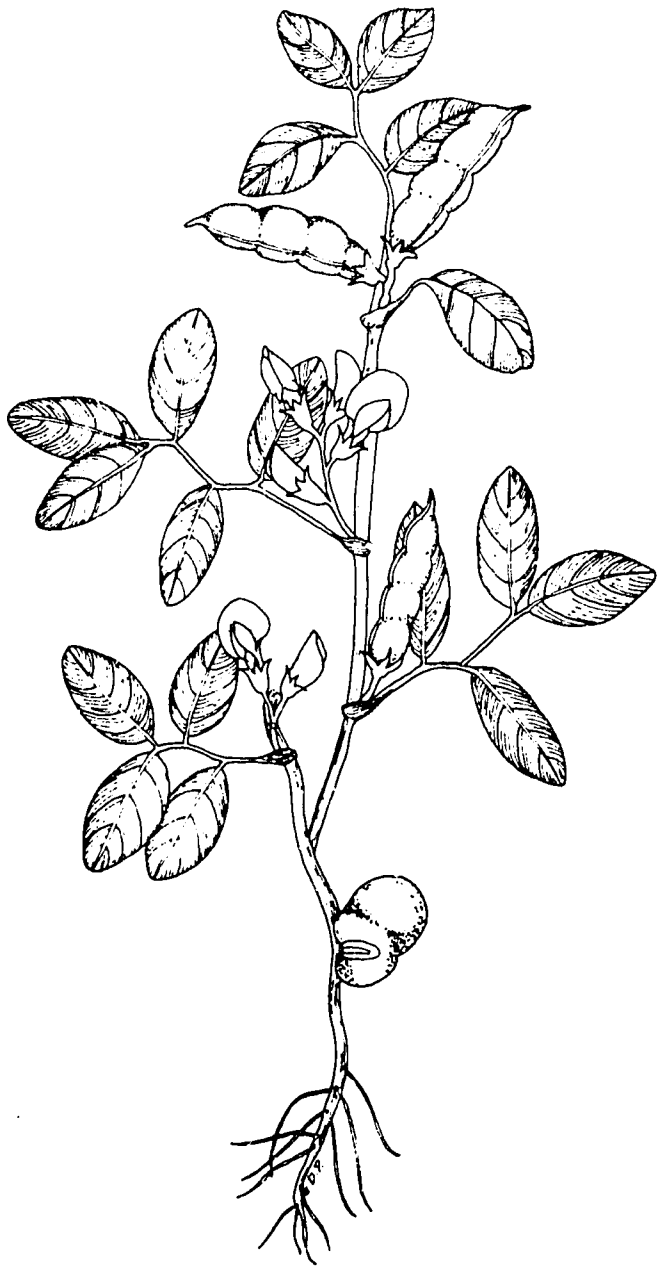

FABA BEAN DESCRIPTORS

AGPG:IBPGR/85/116
June 1985

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES
(IBPGR)

and

INTERNATIONAL CENTER FOR AGRICULTURAL RESEARCH IN THE DRY AREAS
(ICARDA)

FABA BEAN DESCRIPTORS

IBPGR Secretariat
Rome, 1985

The International Board for Plant Genetic Resources (IBPGR) and the International Center for Agricultural Research in the Dry Areas (ICARDA) are autonomous, international, scientific organizations under the aegis of the Consultative Group on International Agricultural Research (CGIAR).

The basic function of the IBPGR is to promote and coordinate an international network of genetic resources centres to further the collection, conservation, documentation, evaluation and use of plant germplasm and thereby contribute to raising the standard of living and welfare of people throughout the world. The Consultative Group mobilizes financial support from its members to meet the budgetary requirements of the Board.

The principal objectives of ICARDA are to conduct research into and develop improved cropping, livestock, and cropping-livestock systems; to serve as an international center for the improvement of barley, lentils, and faba beans; to serve as a regional center, in cooperation with other appropriate international agricultural research centers, for the improvement of other major crops in the region, such as wheat and chickpeas; to collaborate with and foster cooperation and communications among other national, regional, and international institutions in the development of adaptation, testing and demonstration of improved crops, farming, and livestock systems; and to provide and foster research and other activities to further its objectives.

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CONTENTS

PREFACE

This descriptor list has been prepared in an IBPGR standard format following advice on descriptors and descriptor states from a meeting held at ICARDA on May 10-11 1982, and subsequent from crop experts throughout the world (see Appendix). The IBPGR encourages the collection of data on the first four categories of this list; 1. Accession; 2. Collection; 3. and 4. Characterization and preliminary evaluation. The IBPGR endorses the information in categories 1-4 as the minimum that ideally should be available for any one accession. Other descriptors are given in categories 5 onwards that will enable the simple encoding of further characterization and evaluation data and which can serve as examples for the creation of additional descriptors in the IBPGR form by any user.

Although the suggested coding should not be regarded as the definitive scheme, this format has the full backing of the IBPGR and is promoted worldwide. The descriptor list given here provides an international format and thereby produces a universally understood 'language' for all plant genetic resource data. The adoption of this scheme for all data encoding, or at least the production of a transformation method to convert other schemes to the IBPGR format, will produce a rapid, reliable and efficient means for information storage, retrieval and communication. This will greatly assist the utilization of germplasm throughout the international plant genetic resources network. It is recommended, therefore, that information should be produced by closely following this descriptor list with regard to: ordering and numbering descriptors; using the descriptor specified; and using the descriptor states recommended.

Any suggestions for modifications will be welcomed by the IBPGR Secretariat, Rome.

DESCRIPTOR LIST FOR FABA BEAN

The IBPGR now uses the following definitions in genetic resources documentation:

i) passport (accession identifiers and information recorded by collectors);

ii) characterization (consists of recording those characters which are highly heritable, can be easily seen by the eye and are expressed in all environments);

iii) preliminary evaluation (consists of recording a limited number of additional traits thought desirable by a consensus of users of the particular crop).

Characterization and preliminary evaluation will be the responsibility of the curators, while further characterization and evaluation should be carried out by the plant breeder. The data from further evaluation should be fed back to the curator who will maintain a data file.

The following internationally accepted norms for the scoring or coding of descriptor states should be followed as indicated below:

a) measurements are made according to SI system. The units to be applied are given in square brackets following the descriptor;

b) many descriptors which are continuously variable are recorded on a 1-9 scale. The authors of this list have sometimes described only a selection of the states, e.g. 3, 5 and 7 for such descriptors. Where this has occurred the full range of codes is available for use by extension of the codes given or by interpolation between them - e.g. in Section 8 (Pest and disease susceptibility) 1 = extremely low susceptibility and 8 = high to extremely high susceptibility;

c) presence/absence of characters are scored as + (present) and 0 (absent);

d) for descriptors which are not generally uniform throughout the accession (e.g. mixed collection, genetic segregation) mean and standard deviation could be reported where the descriptor is continuous or mean and 'x' where the descriptor is discontinuous;

e) when the descriptor is inapplicable, '0' is used as the descriptor value, e.g. if an accession does not form flowers, 0 would be scored for the following descriptor

Flower colour

1 White
2 Yellow
3 Red
4 Purple

f) blanks are used for information not yet available;

g) standard colour charts, e.g. Royal Horticultural Society Colour Chart, Methuen Handbook of Colour, Munsell Color Charts for Plant Tissues are strongly recommended for all ungraded colour characters (the precise chart used should be specified in the NOTES descriptor, 11);

h) dates should be expressed numerically in the format DDMMYYY, where

DD - 2 digits to represent the day
MM - 2 digits to represent the month
YYYY - 4 digits to represent the year

PASSPORT

1. ACCESSION DATA

1.1 ACCESSION NUMBER

This number serves as a unique identifier for accessions and is assigned by the curator when an accession is entered into his collection. Once assigned this number should never be reassigned to another accession in the collection. Even if an accession is lost, its assigned number is still not available for re-use. Letters should occur before the number to identify the genebank or national system (e.g. MG indicates an accession comes from the genebank at Bari, Italy; PI indicates an accession within the USA system)

1.2 DONOR NAME

Name of institution or individual responsible for donating the germplasm

1.3 DONOR IDENTIFICATION NUMBER

Number assigned to accession by the donor

1.4 OTHER NUMBERS ASSOCIATED WITH THE ACCESSION (other numbers can be added as 1.4.3 etc.)

Any other identification number known to exist in other collections for this accession, e.g. USDA Plant Inventory number (not collection number, see 2.1)

1.4.1 Other number 1

1.4.2 Other number 2

1.5 SCIENTIFIC NAME

1.5.1 Genus

1.5.2 Species

1.5.3 Botancial variety (convariety)

1.6 NAME OF CULTIVAR, BREEDER'S LINE OR POPULATION

Nomenclature and designations assigned to breeders' material

1.7 ACQUISITION DATE

The date in which the accession entered the collection

1.8 DATE OF LAST REGENERATION OR MULTIPLICATION

1.9 ACCESSION SIZE

Approximate number of seeds of accession in collection

1.10 NUMBER OF TIMES ACCESSION REGENERATED

Number of regenerations or multiplications since original collection

1.11 METHOD OF POLLINATION OF ORIGINAL COLLECTION

1 Selfed
2 Insect pollinated in isolation
3 Pollination without isolation

2. COLLECTION DATA

2.1 COLLECTOR'S NUMBER

Original number assigned by collector of the sample normally composed of the name or initials of the collector(s) followed by a number. This item is essential for identifying duplicates held in different collections and should always accompany sub-samples wherever they are sent

2.2 COLLECTING INSTITUTE

Institute or person collecting/sponsoring the original sample

2.3 DATE OF COLLECTION OF ORIGINAL SAMPLE

2.4 COUNTRY OF COLLECTION OR COUNTRY WHERE CULTIVAR/VARIETY BRED

Use the 3 letter abbreviations supported by the Statistical Office of the United Nations. Copies of these abbreviations are available from the IBPGR Secretariat and have been published in the FAO/IBPGR Plant Genetic Resources Newsletter number 49

2.5 PROVINCE/STATE

Name of the administrative subdivision of the country in which the sample was collected

2.6 AGROCLIMATIC TYPE OF THE COLLECTION

1 Mediterranean
2 European spring type
3 European winter type
4 Other (specify in the NOTES descriptor, 11)

2.7 LOCATION OF COLLECTION SITE

Number of kilometres and direction from nearest town, village or map grid reference (e.g. TIMBUKTU7S means 7 km south of Timbuktu).

2.8 DISTANCE FROM ANY OTHER VICIA FABA FIELD [m]

2.9 LATITUDE OF COLLECTION SITE

Degrees and minutes followed by N (north) or S (south), e.g 1030S

2.10 LONGITUDE OF COLLECTION SITE

Degrees and minutes followed by E (east) or W (west), e.g. 7625W

2.11 ALTITUDE OF COLLECTION SITE [m]

Elevation above sea level

2.12 ASPECT

N, S, E, W or facing

2.13 SLOPE

3 Shallow
5 Moderate
7 Steep

2.14 COLLECTION SOURCE

1 Wild
2 Farm land
3 Farm store
4 Backyard
5 Village market
6 Commercial market
7 Institute
8 Other (specify in the NOTES descriptor, 11)

2.15 STATUS OF SAMPLE

1 Wild (escaped)
2 Weedy
3 Breeder's line
4 Primitive cultivar/landrace
5 Advance cultivar (bred)
6 Other (specify in the NOTES descriptor, 11)

2.16 LOCAL/VERNACULAR NAME

Name given by farmer to cultivar/landrace/weed

2.17 NUMBER OF PLANTS SAMPLED

Approximate number of plants collected in the field to produce this accession

2.18 PHOTOGRAPH

Was a photograph taken of the accession or environment at collection?

0 No
+ Yes

2.19 HERBARIUM SPECIMEN

Was a herbarium specimen collected?

0 No
+ Yes

2.20 LANDFORM

1 Swamp
2 Flood plain
3 Plain level
4 Undulating
5 Rolling
6 Hilly
7 Hilly dissected
8 Steeply dissected
9 Mountainous
10 Other (specify in the NOTES descriptor, 11)

2.21 SOIL TEXTURE

1 Clay
2 Clay-silt
3 Silt
4 Loam
5 Silt-sand
6 Sand
7 Highly organic

2.22 SOIL DEPTH

1 Less than plough depth
2 Equal to plough depth
3 More than plough depth

2.23 SOIL WATER CAPACITY

3 Low
5 Intermediate
7 High
9 Excessive

2.24 SALINITY

0 None
3 Low
5 Medium
7 High

2.25 ORGANS USED AS PRIMARY PRODUCT

1 Whole plant
2 Green pod
3 Grain
4 Other (specify in the NOTES descriptor, 11)

2.26 OTHER NOTES FROM COLLECTOR

Collectors will record ecological information. For cultivated crops, cultivation practices such as irrigation, season of sowing, etc. will be recorded. In the case of cultivars, their attributes that are already known, such as yield or resistance to disease, should also be recorded

CHARACTERIZATION AND PRELIMINARY EVALUATION

3. SITE DATA

3.1 COUNTRY OF CHARACTERIZATION AND PRELIMINARY EVALUATION

3.2 SITE (RESEARCH INSTITUTE)

3.3 NAME OF PERSON IN CHARGE OF CHARACTERIZATION

3.4 SOWING DATE

3.5 HARVEST DATE

4. PLANT DATA

4.1 VEGETATIVE

4.1.1 Growth habit

1 Determinate, i.e. stems with terminal inflorescence
2 Semi-determinate, i.e. without terminal inflorescence
3 Indeterminate

4.1.2 Stem pigmentation at flowering time

0 Absent
3 Weak
5 Intermediate
7 Strong
X Mixed

4.1.3 Leaflet size

To be observed on fully expanded leaves at the intermediate flowering nodes

3 Small
5 Medium
7 Large

4.1.4 Branching from basal nodes

Mean number of branches (to the nearest whole number) per plant taken from 5 representative plants in late flowering stage

4.1.5 Branching from higher nodes

0 Non-branching
+ Branching
X Mixed

4.1.6 Plant height [cm]

Measured at near maturity from ground to the tip of the plant. Average of 10 plants

4.1.7 Stem colour at maturity

1 Light
2 Dark

4.2 INFLORESCENCE AND FRUIT

4.2.1 Days to flowering

Days from sowing to 50% of plants in flower. However, in dry land areas where planting in dry soils, it is counted from the first day of rainfall or irrigation which is sufficient for germination

4.2.2 Days to maturity

Days from sowing until 90% of the pods have dried. See 4.2.1 for planting in dry soils

4.2.3 Flower ground colour

Ground colour of standard petal (flag)

1 White
2 Violet
3 Dark brown
4 Light brown
5 Pink
6 Red
7 Yellow
8 Other (specify in the NOTES descriptor, 11)
X Mixed

4.2.4 Intensity of streaks

Streaks on standard petal (flag)

0 No streaks
3 Slight
5 Moderate
7 Intense

4.2.5 Wing petal colour

1 Uniformly white
2 Uniformly coloured
3 Spotted
X Mixed

4.2.6 Pod angle/attitude at maturity (on second or third pod-bearing node)

1 Erect
2 Horizontal
3 Pendent
X Mixed

4.2.7 Pod shape

1 Sub-cylindrical
2 Flattened constricted
3 Flattened non-constricted
X Mixed

4.2.8 Pod surface reflectance

To be observed while pods are still tender

1 Matte
2 Glossy
X Mixed

4.2.9 Pod colour at maturity

1 Light (yellow)
2 Dark (brown/black)
X Mixed

4.2.10 Pod length [cm]

Mean of 5 dry pods

4.3 SEED

4.3.1 Maximum number of ovules per pod

4.3.2 Number of seeds per pod

Mean of 5 dry pods

4.3.3 100 seed weight [g]

Average weight of 2 samples of 100 randomly chosen seeds

4.3.4 Ground colour of testa (seed coat)

Observed immediately after harvest (within month after harvest)

1 Black
2 Dark brown
3 Light brown
4 Light green
5 Dark green
6 Red
7 Violet
8 Yellow
9 White
10 Grey
11 Other (specify in the NOTES descriptor, 11)
X Mixed

4.3.5 Hilum colour

1 Black
2 Colourless
3 Other (specify in the NOTES descriptor, 11)
X Mixed

4.3.6 Seed shape

1 Flattened
2 Angular
3 Round
X Mixed

FURTHER CHARACTERIZATION AND EVALUATION

Where a scale is used to characterize accessions this should be in reference to agreed standards. For a 1 to 9 scale there should be examples of standard cultivars for at least classes 3 and 7. Information on this is available from ICARDA which can also supply seeds

5. SITE DATA

5.1 COUNTRY OF FURTHER CHARACTERIZATION AND EVALUATION

5.2 SITE (RESEARCH INSTITUTE)

5.3 NAME OF PERSON IN CHARGE OF EVALUATION

5.4 SOWING DATE

5.5 HARVEST DATE

5.6 PLANTING DENSITY

5.6.1 Distance between rows [cm]

5.6.2 Distance within rows [cm]

6. PLANT DATA

6.1 VEGETATIVE

6.1.1 Stipule spot pigmentation

0 Absent
+ Present

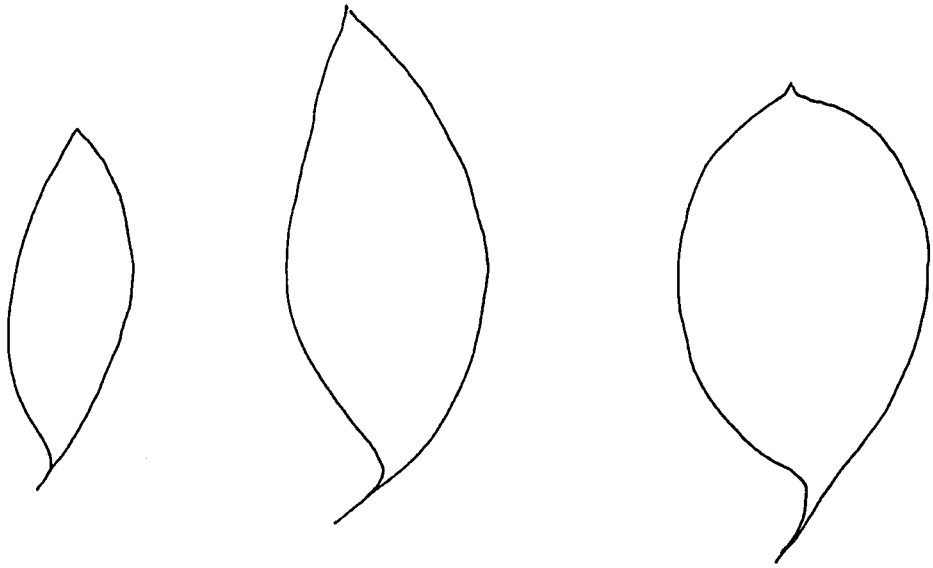
6.1.2 Leaflet shape

To be observed on middle leaflet of fully expanded leaf at the intermediate flowering nodes of the plant. See Fig. 1 on next page

1 Narrow (elongate)
2 Intermediate (sub-elliptic)
3 Rounded (sub-orbicular)

6.1.3 Number of leaflets per leaf

Mean of 5 leaves (1 from each of 5 separate plants) observed on fully expanded leaves at the median flowering node



1 Narrow 2 Intermediate 3 Rounded

Fig. 1. Leaflet shape

6.1.4 Stem thickness [cm]

Mean stem thickness of single representative tiller from 10 representative plants. Measured as width of one side of stem at mid-height of plant at early podding stage

6.1.5 Resistance to lodging

3 Low
5 Medium
7 High

6.2 INFLORESCENCE AND FRUIT

6.2.1 Number of flowers per inflorescence

Mean number of flowers per raceme from 2 intermediate nodes on 5 representative plants

6.2.2 Height of lowest pod-bearing node at harvest [cm]

Mean of 5 plants

6.2.3 Number of pods per node

Mean number of pods on the second pod-bearing node of 5 plants

6.2.4 Pod distribution on the stem

1 Uniform
2 Mainly basal
3 Mainly terminal

6.2.5 Pod shattering

0 Non-shattering (wrinkled-pod type)
+ Shattering

6.2.6 Male fertility

1 Male fertile
2 Male sterile
  2.1 Genetic male sterility
  2.2 Cytoplasmic male sterility

6.2.7 Autofertility

Applicable mainly to inbred lines and landraces. Evaluated in plants from insect proof cages. A visual estimate of pod and seed set on lower nodes

3 Poor
5 Medium
7 Good

6.3 SEED

6.3.1 Testa pattern

1 Plain
2 Speckled
3 Ringed

6.3.2 Protein content [%]

Measured on dry matter basis

6.3.3 Sulphur amino acids (per 16 g N)

1 Methionine
2 Cystine

6.3.4 Vicine and convicine content [%]

Percentage of dry seed weight

6.3.5 Cooking time

The time in minutes for cooking unsoaked seed to softness in boiling distilled water at atmospheric pressure

6.3.6 Seed yield [g/m^2]

Yield of seed after drying. Relate to a standard or check cultivar and specify location and year

7. STRESS SUSCEPTIBILITY

Scored on a scale 1-9, where

3 Low susceptibility
5 Medium susceptibility
7 High susceptibility

7.1 LOW TEMPERATURE

7.1.1 Winter kill

Proportion of the plants emerged prior to winter which survive through winter

7.1.2 Low temperature damage

Damage caused to aerial plant parts. Not associated with winter kill

7.2 HIGH TEMPERATURE

7.3 DROUGHT

7.4 HIGH SOIL MOISTURE

7.5 SALINITY

8. PEST AND DISEASE SUSCEPTIBILITY

Scored on a 1-9 scale, where

3 Low susceptibility
5 Medium susceptibility
7 High susceptibility

8.1	PESTS		
	8.1.1	Aphis spp.	Aphids
	8.1.2	Sitona spp.	Leaf weevils
	8.1.3	Liriomyza spp.	Leaf miners
	8.1.4	Lixus spp.	Stem borers
	8.1.5	Bruchus spp.	Seed weevils
	8.1.6	Ditylenchus dipsaci	Stem nematodes
	8.1.7	Orobanche crenata	Broomrape
	8.1.8	Other (specify in the NOTES descriptor, 11)	
8.2	FUNGI		
	8.2.1	Bortrytis fabae	Chocolate spot
	8.2.2	Ascochyta fabae	Ascochyta blight
	8.2.3	Alternaria spp.	Leaf spot
	8.2.4	Uromyces fabae	Rust
	8.2.5	Erysiphe polygoni	Powdery mildew
	8.2.6	Rhizoctonia spp.	Root rot complex
	8.2.7	Fusarium spp.	Root rot complex
	8.2.8	Sclerotinia spp.	Stem rot
	8.2.9	Other (specify in the NOTES descriptor, 11)	
8.3	BACTERIA		
8.4	VIRUS		
	8.4.1	Alfalfa mosaic (AMV)	
	8.4.2	Bean leaf roll (BLRV)	
	8.4.3	Bean yellow mosaic (BYMV)	
	8.4.4	Pea enation mosaic (PEMV)	
	8.4.5	Broad bean true mosaic (BBTMV = EAMV)	

8.4.6 Broad bean stain (BBSV)

8.4.7 Other (specify in the NOTES descriptor, 11)

9. ALLOENZYME COMPOSITION

This may prove to be a useful tool for identifying duplicate accessions

10. CYTOLOGICAL CHARACTERS AND IDENTIFIED GENES

For identified genes see Chapman, B.P. (1981) Genetic variation within Vicia faba. Supplement to Fabis, 3: 1-12, or its latest revision

11. NOTES

Give additional information where descriptor state is noted as 'other' as, for example in descriptors 2.6, 4.3.4, etc. Also include here any further relevant information from the collector, curator, nutritionist, etc.

12. DESCRIPTORS OF NUTRITIONAL IMPORTANCE OTHER THAN UNDER 6.3

Certain characters which have or may have significant nutritional implication for animal feed and feed technology industries and whose assays are technically more demanding should be accumulated by genebank institutions in cooperation with other interested outside institutions or laboratories

13. FUTURE DESCRIPTORS

The list will remain open for inclusion of future descriptors such as those pertaining to physiological traits, which can be rapidly screened. Most of the characters in the present list are of a visual morphological nature and an appropriate extension would be to use microscopic evaluation of tissue distribution at critical sites. Fluorescent probes now exist for many compounds, e.g. H_2O, protein, lipids, starch, lignin, DNA, RNA, as well as specific probes, e.g. immunofluorescent protein probes. Distribution of many of these compounds is potentially important for stress resistance factors (lignin with lodging for example) quality factors (seed protein distribution) and yield (e.g. stem starch, vascular tissue development). These tissue distributions are genetically controlled and not subject to great environmental interaction

APPENDIX I

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